

find, indeed, that such plants have little strengthening tissue, few conducting channels for sap, no stomata or breathing pores, no impervious cuticle to the epidermis and chlorophyll even in the outermost layer of cells.

In addition, the whole plant is usually permeated by air-channels, often of large size, giving the tissues a spongy texture. These air spaces serve to give buoyancy to the parts and also for the aeration of those parts which have not ready access to the dissolved gases. Frequently the volume of a plant member taken up by these air spaces is greater than that occupied by the plant cells.

We shall find, however, that the plant we have taken for consideration is not quite so far removed in structure from a typical land plant as is the case in those totally submerged forms.

Roughly speaking, we have two types of truly aquatic plants—that is excluding those forms which grow in swampy situations on the edges of the water—namely, those which are rooted in the mud or gravel at the bottom, and those which float freely at the surface. To the latter division belong a few higher plants like the common duck-weeds and many lower forms, such as filamentous algae and diatoms, whilst our lily is an example of the former class.

We will now consider, in some detail, the form and structure of the Water Lily, beginning with those parts which serve to anchor it securely at the bottom of the pond or stream.

The stem, which consists of a thick rhizome or "rootstock," is fixed more or less horizontally in the mud, and is blackish in color. It is about the shape and thickness of a man's arm, the thicker end being the basal or older one. At the tip is a kind of bud formed

of undeveloped leaves, and from the part a little behind this, spring the leaf-stalks of the present season. Further back again the surface of the stem is covered with the bases of the old leaves which have fallen away. These show very clearly the characteristic air channels—in fact the whole rootstock contains so much air that it floats readily if cut from its moorings.

Numerous rootlets spring from the sides and undersurface. These are about the thickness of a goose-quill and about a foot in length. Since they are growing in a muddy substratum they are provided near the tip with numerous root-hairs, whereas truly aquatic roots rarely possess these structures, absorption being carried on through the entire surface of the root. Even such land plants as a geranium or buckwheat, when grown artificially in a culture solution, produce rootlets devoid of the characteristic root-hairs.

The leaves all float on the surface of the water, their excessively long, flexible petioles serving to spread them out in such a way as to prevent overcrowding. They are oval in shape, with entire margins. The petiole is attached near the center (peltate attachment), whilst behind this the leaf is notched. This is a common type of floating leaf, representing a simple plan of development. Acute points to drain off rapidly a weight of rain water are not necessary, and furthermore, as a continuous plate offers more resistance to a downward pull, it is an advantage that the leaf should be entire.

The upper surface possesses a thick cuticle fortified with wax, so as to prove very effective against rain. The leaf, too, is raised slightly at the base, whilst the edges are somewhat crisped. Water falling on the surface collects in drops without wetting the leaf, and a